

Claims

- [1] A webbing take-up device comprising:
- a take-up shaft around which a webbing for restraining a passenger is wound such that the webbing can be taken up and pulled out;
 - a motor; and
 - a clutch that is mechanically intervened between the motor and the take-up shaft, transmits the rotation of the motor to the take-up shaft to cause the take-up shaft to rotate, and cuts off the transmission of rotation arising at the take-up shaft side to prevent that rotation from being transmitted to the motor,
 - wherein the clutch includes
 - a rotating body that is disposed coaxially with respect to the take-up shaft and rotates as a result of the rotation of the motor being transmitted to the rotating body,
 - sliders that are configured to be relatively movable within a predetermined range with respect to the rotating body, and
 - lock bars that are disposed on the rotating body and ordinarily retained by the sliders in positions where the lock bars are disengaged from the take-up shaft, and when the rotating body rotates in one direction about its axial line, the lock bars engage with the take-up shaft, transmit to the take-up shaft the rotation of the rotating body in the one direction about its axial line, and allow the relative rotation of the take-up shaft with respect to the rotating body in the one direction about its axial line, and when the rotating body rotates in the other direction about its axial line, the lock bars are moved to and retained in the disengaged positions by the sliders.

- [2] A webbing take-up device comprising:

- a take-up shaft around which a webbing for restraining a passenger is wound such that the webbing can be taken up and pulled out;
- a motor; and
- a clutch that is mechanically intervened between the motor and the take-up shaft, transmits the rotation of the motor to the take-up shaft to cause the take-up shaft to rotate in the webbing take-up direction, and cuts off the transmission of rotation arising at the take-up shaft side to prevent that rotation from being transmitted to the motor,
- wherein the clutch includes
 - a case,
 - a rotating body that is disposed coaxially with respect to the take-up shaft and rotates as a result of the rotation of the motor being transmitted to the rotating body,
 - a ratchet that is integrally coupled to the take-up shaft,
 - sliders that are configured to be relatively movable within a predetermined range with respect to the rotating body as a result of being retained in the case by frictional force, and
 - lock bars that are disposed on the rotating body, are always biased in a direction in which the lock bars engage with the ratchet, and are ordinarily retained by the sliders in positions where the lock bars are disengaged from the ratchet, and when the rotating body rotates in the webbing take-up direction, the lock bars move away from the sliders such that the retention is released, engage with the ratchet by the biasing force, transmit to the ratchet the rotation of the rotating body in the webbing take-up direction,

and allow the relative rotation of the ratchet with respect to the rotating body in the webbing take-up direction, and when the rotating body rotates in the webbing pullout direction, the lock bars move toward the sliders and are moved to and retained in the disengaged positions by the sliders.

- [3] The webbing take-up device of claim 1 or 2, wherein the rotating body includes a gear wheel that rotates as a result of the rotation of the motor being transmitted to the gear wheel,
 - a rotor that supports the lock bars, and
 - spring pawls that are disposed between the gear wheel and the rotor, couple both to each other, and transmit the rotation of the gear wheel to the motor, and when a load equal to or greater than a predetermined value acts on the rotor, the spring pawls cut off the transmission of rotation between the gear wheel and the rotor by the load to enable both to relatively idle.

[4] The webbing take-up device of claim 1, wherein the sliders are configured to relatively move within a predetermined range with respect to the rotating body when the rotating body rotates in the one direction about its axial line, such that the lock bars that rotate integrally with the rotating body separate from the sliders.

[5] The webbing take-up device of claim 4, wherein the lock bars are configured to engage with the take-up shaft by moving away from the sliders.

[6] The webbing take-up device of claim 4, wherein the lock bars are configured to disengage from the take-up shaft when a load that causes the take-up shaft to relatively rotate with respect to the rotating body in the one direction about its axial line is applied to the take-up shaft.

[7] The webbing take-up device of claim 4, wherein the sliders are configured to relatively move within a predetermined range with respect to the rotating body when the rotating body rotates in the other direction about its axial line, such that the lock bars that rotate integrally with the rotating body reengage with the sliders.

[8] The webbing take-up device of claim 7, wherein the lock bars are configured such that they are retained in the positions where they are disengaged from the take-up shaft by reengaging with the sliders.

[9] The webbing take-up device of claim 2, wherein the sliders are configured to relatively move within a predetermined range with respect to the rotating body when the rotating body rotates in the webbing take-up direction, such that the lock bars that rotate integrally with the rotating body separate from the sliders.

[10] The webbing take-up device of claim 9, wherein the lock bars are configured to engage with the ratchet by moving away from the sliders.

[11] The webbing take-up device of claim 9, wherein the lock bars are configured to

disengage from the ratchet when a load that causes the ratchet to relatively rotate with respect to the rotating body in the webbing take-up direction is applied to the ratchet.

[12] The webbing take-up device of claim 9, wherein the sliders are configured to relatively move within a predetermined range with respect to the rotating body when the rotating body rotates in the webbing pullout direction, such that the lock bars that rotate integrally with the rotating body reengage with the sliders.

[13] The webbing take-up device of claim 12, wherein the lock bars are configured such that they are retained in the positions where they are disengaged from the ratchet by reengaging with the sliders.

[14] The webbing take-up device of claim 1 or 2, wherein at least one of the sliders and the lock bars include retention portions that cause predetermined drag to arise with respect to the movement of the sliders away from the lock bars when the rotating body is stopped.

[15] The webbing take-up device of claim 14, wherein the sliders and the lock bars are configured to mesh and engage with each other a predetermined dimension with respect to the radial direction of the rotating body, and the engagement portions of the sliders and the lock bars are the retention portions.

[16] A webbing take-up device comprising:

a take-up shaft around which a webbing for restraining a passenger is wound such that the webbing can be taken up and pulled out;

a motor; and

a clutch that is mechanically intervened between the motor and the take-up shaft, transmits the rotation of the motor to the take-up shaft to cause the take-up shaft to rotate, and cuts off the transmission of rotation arising at the take-up shaft side to prevent that rotation from being transmitted to the motor,

wherein

the clutch includes

a rotating body that is disposed coaxially with respect to the take-up shaft and rotates as a result of the rotation of the motor being transmitted to the rotating body,

sliders that are configured to be relatively movable within a predetermined range with respect to the rotating body and include push retention pieces that protrude toward one side in the moving direction, and

lock bars that are disposed on the rotating body, are always biased in a direction in which they engage with the take-up shaft, include release pieces that protrude toward the push retention pieces of the sliders, and are ordinarily retained in positions where the lock bars are disengaged from the take-up shaft as a result of the release pieces engaging with the push retention pieces, and when the rotating body rotates in one direction about its axial line, the lock bars move away from the sliders such that the retention is released, engage with the take-up shaft by the biasing force, and transmit to the take-up shaft the rotation of the rotating body in the one direction about its axial line, and when the rotating body rotates in the other direction about its axial line, the lock bars move

toward the sliders and are moved to and retained in the disengaged positions as a result of the release pieces engaging with the push retention pieces, and

at least one of the push retention pieces of the sliders and the release pieces of the lock bars include retention portions that cause predetermined drag to arise with respect to the movement of the sliders away from the lock bars when the rotating body is stopped.

[17] The webbing take-up device of claim 16, wherein the retention portions are configured as slanted surfaces that cause the lock bars to move a predetermined amount in the direction in which the lock bars disengage from the take-up shaft counter to the biasing force when the sliders move away from the lock bars.

[18] A webbing take-up device comprising:

a take-up shaft around which a webbing for restraining a passenger is wound such that the webbing can be taken up and pulled out;

a motor; and

a clutch that is mechanically intervened between the motor and the take-up shaft, transmits the rotation of the motor to the take-up shaft to cause the take-up shaft to rotate, and cuts off the transmission of rotation arising at the take-up shaft side to prevent that rotation from being transmitted to the motor,

wherein the clutch includes

a rotating body that is disposed coaxially with respect to the take-up shaft and rotates as a result of the rotation of the motor being transmitted to the rotating body,

sliders that are configured to be relatively movable within a predetermined range with respect to the rotating body, and

lock bars that are disposed on the rotating body and are always biased in a direction in which the lock bars disengage from the take-up shaft, and when the rotating body rotates in one direction about its axial line, the lock bars engage with the take-up shaft as a result of being pushed toward the take-up shaft by the sliders and transmit to the take-up shaft the rotation of the rotating body in the one direction about its axial line, and when the rotating body rotates in the other direction about its axial line, the lock bars are moved to and retained in the disengaged positions by the biasing force as a result of the pushing by the sliders being released.

[19] A webbing take-up device comprising:

a take-up shaft around which a webbing for restraining a passenger is wound such that the webbing can be taken up and pulled out;

a motor; and

a clutch that is mechanically intervened between the motor and the take-up shaft, transmits the rotation of the motor to the take-up shaft to cause the take-up shaft to rotate, and cuts off the transmission of rotation arising at the take-up shaft side to prevent that rotation from being transmitted to the motor,

wherein the clutch includes

a rotating body that is disposed coaxially with respect to the take-up shaft and rotates as a result of the rotation of the motor being transmitted to the rotating body,

a pair of sliders that are configured to be relatively movable within a predetermined range with respect to the rotating body,

a spacer that couples together and synchronizes the pair of sliders,
and

a pair of lock bars that are disposed on the rotating body and are
ordinarily retained by the sliders in positions where the lock bars are disengaged from the
take-up shaft, and when the rotating body rotates in one direction about its axial line, the
retention is released such that lock bars engage with the take-up shaft and transmit to the
take-up shaft the rotation of the rotating body in the one direction about its axial line, and
when the rotating body rotates in the other direction about its axial line, the lock bars are
moved to and retained in the disengaged positions by the sliders.

[20] The webbing take-up device of claim 19, wherein the clutch includes a case and
the spacer slidingly contacts the case.